



Critical Care Therapy and Respiratory Care Section

Category:	Clinical
Section:	Clinical Monitoring
Title:	EEG Electrode Placement and Troubleshooting Service in 10D
Policy #:	1B
Original:	07/01

1.0 DESCRIPTION

1.1 Purpose

The Critical Care Therapy and Respiratory Care Section (CCTRCS), in collaboration with the NINDS EEG Section (ES), will provide support for EEG monitoring on patients admitted to the medical intensive care unit if EEG monitoring is needed. The ES responsibilities will include initiation of the NeuroWorks system and application of electrodes to the patient's head. The CCTRCS will provide support of the NeuroWorks EEG system if the need for extended or long term monitoring of the patient is required. CCTRCS personnel will be proficient in the maintenance and troubleshooting of the NeuroWorks system. The CCTRCS personnel will also be responsible for the collection and transfer of all EEG data to the neurology service.

1.2 Indications

All routine diagnostic EEG studies will continue to be performed by the ES. Extended or long-term EEG monitoring procedures will be supported by the CCTRCS in collaboration with ES. The primary indication for an extended study will include patients who are mechanically ventilated and chemically paralyzed in order to detect underlying seizure activity, when assessing neurologic function is sub-optimal.

1.3 Contraindications

There are no contraindications to perform this non-invasive EEG procedure.

1.4 Precautions/Complications

All EEG electrodes used on patients diagnosed with the following infectious CNS diseases must be sent to Central Hospital Supply to be destroyed.

- 1.4.1 Jakob-Creutzfeldt disease
- 1.4.2 Atypical dementia
- 1.4.3 Fatal familial insomnia
- 1.4.4 Gerstmann-Straussler-Scheinker syndrome
- 1.4.5 Prion disease (known or suspected)
- 1.4.6 Kuru syndrome
- 1.4.7 Slow virus encephalitis
- 1.4.8 Transmissible spongiform encephalopathies
- 1.4.9 Neurologic syndromes with unclear etiologies

1.5 Adverse Reactions and Interventions

No adverse reactions or interventions indicated.

1.6 Limitations of Procedure

This procedure is limited only to ICU patients who are mechanically ventilated, heavily sedated and/or chemically paralyzed in order to detect underlying seizure activity.

2.0 EQUIPMENT AND MATERIALS

- 2.1 NeuroWorks digital EEG monitoring system
- 2.2 26 EEG electrodes
- 2.3 2 ECG electrodes
- 2.4 Electrolyte conductive paste
- 2.5 Electrolyte gel
- 2.6 5cc syringe

- 2.7 5cc Luer lock syringe
- 2.8 15 Gauge, 1/2 in. blunt tip needle
- 2.9 2 x 2 gauze sponges
- 2.10 Skin preparation gel
- 2.11 Collodian adhesive solution
- 2.12 Collodian remover
- 2.13 Compressed air source
- 2.14 Oxygen connecting tubing
- 2.15 Universal precautions attire

3.0 PROCEDURE – EEG MONITORING

- 3.1 Collect necessary equipment and supplies: NeuroWorks digital EEG monitoring system and a CD for data storage.
- 3.2 Plug in monitoring system into a standard a/c electrical outlet. Avoid outlets close to sinks or fluorescent lights.
- 3.3 Turn system on: on/off switch is located on the back of the monitor in the top right hand corner.
- 3.4 Log on to system by simultaneously pressing the **control**, **alt** and **delete** keys. Enter user name **“administrator”** then enter password **“xltek.”** The patient database will automatically open. Close the database and double click the **“Portable EEG”** icon.
- 3.5 Go to **“File”** and select **“New.”** Enter patient data (minimum of first and last name) and select **“OK.”** The system will automatically perform a bio-cal.
- 3.6 Check impedance levels by selecting **“Impedance Check”** from the **“Controls”** menu bar located at the top of the screen. A bar graph for each electrode will appear on the screen with green bars indicating acceptable impedance levels (normal is less than 5KOhm) and red bars indicating unacceptable impedance levels. All electrodes must have green impedance levels before recording a test. The main cause for high impedance levels is poor contact between the electrode and the skin. Refer to Procedure A and B for troubleshooting electrodes.

- 3.7 Once the impedance check has passed, select **“End.”** (The impedance check will appear as part of the recording.)
- 3.8 Ten seconds of a bio-cal must be recorded prior to selecting a montage. From the “Montage” menu bar select “Bio-cal.”
- 3.9 After the bio-cal recording is complete a montage must be selected for the. Select **“IIA”** from the **“Montage”** menu located on the tool bar. **Note:** All EEG recordings will be done in the “IIA” montage format unless specifically requested by the neurologist.
- 3.10 All recordings will be run for a minimum of 20 minutes. All room conditions (i.e. temperature, noises), patient movements (i.e. eyes open/closed, tremors, head position), patient conditions (i.e. paralyzed, sedated) and patient interactions (i.e. nursing care, suctioning) should be documented. Type and enter these details as they occur.
- 3.11 Once the patient test is complete another 10 second bio-cal must be performed and recorded. Select **“bio-cal”** from the **“montage”** menu bar.
- 3.12 Once the bio-cal has been completed, close out the patient window. A “Technologist’s Report” window will appear. Fill out all appropriate information then select **“OK.”** Another prompt will appear asking, “Are you sure you want to end the current study?” Select **“Yes.”** All data must be stored in the patient database and saved on a CD before shutting down computer.

4.0 PROCEDURE-AVING DATA IN PATIENT DATABASE / ARCHIVING DATA ON A CD

- 4.1 Close out patient study window and double click the **“NeuroWorks database”** icon.
- 4.2 An “Import Studies” window will appear, select **“Import All.”**
- 4.3 Once the data have been imported into the database select **“Close.”** **Note:** A test can be reviewed at any time in the “NeuroWorks database” by highlighting and selecting a particular test.
- 4.4 Insert CD into hard-drive (located on the lower left side of monitor).
- 4.5 Highlight desired patient and click the **“archive”** icon located in the top right hand corner of the screen.
- 4.6 When prompted, “Are you sure you want to delete the original raw files of the studies successfully archived?” select **“No.”**

- 4.7 When the CD Label list appears, close the window. A prompt will appear in the lower right hand corner asking, “Do you want to save the changes you made to Document 1?” select **“Yes.”** Select **“CD Label Template.doc”** from the list of already saved files. Select **“Save.”**
- 4.8 Another prompt will appear in the lower right hand corner asking, “ The file CD Label Template.doc already exists. Do you want to replace the existing file?” select **“Yes.”**
- 4.9 Once the data has been safely archived to the CD, push the blue button on the CD drive to eject the CD. An “Eject Disc” window will appear, select **“Finish.”**
- 4.10 To shut down the computer system, close out the “NeuroWorks database” window and select **“shut down”** from the **“start”** menu bar located in the lower left hand corner of the screen. The computer will ask, “Are you sure you want to shut down?” select **“Yes.”**
- 4.11 Once the display message **“It is now safe to turn off your computer”** appears, turn the machine off (on/off switch is located on the back of the monitor in the top right hand corner).

5.0 PROCEDURES-RE-GELLING AND RE-ATTACHING ELECTRODES

Identify malfunctioning EEG lead(s)/electrode(s) or montages. If electrode appears secure attempt to re-gel following procedure “A”. If the electrode is loose, has become detached or re-gelling fails to restore a dynamic waveform, follow procedure “B”. (Note: Forehead leads FP1, FP2, F7 and F8 tend to loosen more easily than other leads).

In the event that ES places an EEG electrode in an unusual site, ES will notify CCTRCS of its placement and location. Therapists will communicate unusual lead placements using the International (10-20) Electrode Placement chart during Sectional reports at shift change (See Appendix A).

5.1 Procedure A: Re-gel an Electrode

- 5.1.1 Collect appropriate equipment: electrolyte gel, 5cc syringe with blunt tip needle and collodian.
- 5.1.2 Wash and dry hands thoroughly.
- 5.1.3 Don necessary universal precautions attire (see policy on Universal Precautions).

- 5.1.4 Identify patient and explain procedure for re-gelling EEG lead.
- 5.1.5 Attach blunt tip needle to 5cc syringe and fill with electrolyte gel.
(Note: All blunt tip needles and syringes are to be single patient use/single intervention use).
- 5.1.6 Perform an impedance check to determine which electrode is in need of re-gelling. Gently insert the blunt needle tip using a rocking motion into the small hole on top of the malfunctioning electrode. The needle tip must go through the gauze into the cup of the electrode but should not touch the patient's scalp. Insert a small amount of electrolyte gel into the electrode until the waveform quality improves. (Note: Insertion of too much gel may loosen the electrode).
- 5.1.7 Repeat impedance check after re-gelling malfunctioning electrode(s). If impedance does not improve, remove malfunctioning electrode(s) and perform Procedure B: Re-attach an Electrode.
- 5.1.8 Wipe off excess gel and apply a small amount of collodion (adhesive) over the hole in the gauze to seal in the new gel.
- 5.1.9 Check EEG to confirm dynamic waveform.

5.2 Procedure B: Re-attach an Electrode

- 5.2.1 Collect appropriate equipment: electrolyte paste, collodion remover, skin prep gel, gauze, compressed air source, oxygen tubing and collodion.
- 5.2.2 Wash and dry hands thoroughly.
- 5.2.3 Don necessary universal precautions attire (see policy on Universal Precautions).
- 5.2.4 Identify patient and explain procedure for re-attaching leads.
- 5.2.5 Remove "old" electrode paste from site, if necessary, with gauze using a small amount of collodion remover, making sure the contact point on the scalp is clean and dry.
- 5.2.6 Using gauze, gently rub a small amount of abrasive skin prep gel (Omni-prep or Nu Prep) on the contact point of the scalp.

- 5.2.7 Remove “old” electrolyte paste from electrode cup with gauze. Fill cup with electrolyte paste leveling off excess paste so that it is even with the cup rim. Make sure there are **no** bubbles in the paste filling the electrode.
- 5.2.8 Place electrode on the prepped site with lead wire toward the back of the patient’s head. Cover electrode cup and stem with pre-cut gauze.
- 5.2.9 Fill 5cc Luer Lock syringe with collodian (adhesive) and apply evenly over the gauze, using air compressor with attached connecting tubing to dry. The gauze should be neatly molded around the lead for a secure fit.
- 5.2.10 Check EEG to confirm dynamic waveform.

NOTE: If practitioner is unable to obtain a satisfactory waveform after repeated attempts to secure EEG leads, the neurology fellow on-call must be notified.

6.0 PROCEDURES-REMOVAL AND CLEANING OF ELECTRODES

- 6.1 Use a towel to protect patient’s eyes from accidental drippage of collodian remover.
- 6.2 Fill a 5cc Luer Lock syringe with collodian remover and slowly apply remover to the attached electrode, while gently pulling on gauze until electrode is removed.
- 6.3 Electrodes should be soaked in an enzymatic cleaner (the Clinical Center uses Tergal) until all of the electrodes are clean of particulate matter.
- 6.4 Electrodes should then be thoroughly rinsed with sterile water and left to air dry.
- 6.5 Once electrodes are completely dry they should be placed in a sterilization pouch and taken to Central Sterile Supply for **gas** sterilization.

7.0 POST PROCEDURE

- 7.1 Discard all syringes, needles and other disposable items in proper receptacles.
- 7.2 All supplies must be removed from the patient’s room and stored appropriately.

- 7.3 Any remaining collodian must be stored in a “non-flammable” storage cabinet.

8.0 DOCUMENTATION

- 8.1 Documentation should be completed on the 10D Patient Record, 10D Continuous Ventilation Flow Record, and CCTRCS Workload and Productivity Report.

SIGNATURE: _____
Assistant Section Chief, CCTRCS, CCMD

DATE: _____

SIGNATURE: _____
Section Chief, CCTRCS, CCMD

DATE: _____

SIGNATURE: _____
Medical Director, CCTRCS, CCMD

DATE: _____

(Orig. 11/01)